

Outer Continental Shelf
Performance Measures:
Safety, Environmental & Regulatory Compliance
Indicators from the U.S. Offshore Oil and Gas Industry
Report for 1996 -1998

August 1999

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ACRONYMS

API	American Petroleum Institute
EPA	U.S. Environmental Protection Agency
IADC	International Association of Drilling Contractors
IIR	Industry Incident Rate
INC	Incident of Non-compliance (MMS)
IPAA	Independent Petroleum Association of America
MMS	U.S. Minerals Management Service
NPDES	National Pollutant Discharge Elimination System (EPA)
OCS	Outer Continental Shelf
OOC	Offshore Operators Committee
PIR	Participants' Incident Rate
PMSC	Performance Measures Steering Committee
PMWG	Performance Measures Work Group
RP	Recommended Practice (API)
SEMP	Safety and Environmental Management Program
USCG	U.S. Coast Guard

ABBREVIATIONS

Bbl	barrel
BOE	barrel of oil equivalent
MCF	thousand cubic feet

EXECUTIVE SUMMARY

The purposes of the Outer Continental Shelf (OCS) Performance Measures Program are to provide OCS-wide indicators of operating safety and environmental performance, and to help characterize the operational effect of the Minerals Management Service (MMS) Safety and Environmental Management Program (SEMP). The MMS initiated SEMP in 1991 to provide industry managers with a tool for systematically integrating 12 fundamental oil and gas exploration, construction, and production activities. The purpose of SEMP is to help offshore operators and their contractors reduce or prevent accidents. Since 1991, MMS has worked with industry toward a common goal of voluntarily applying SEMP to all OCS drilling and production operations. According to a 1998 year-end survey made by the American Petroleum Institute, most OCS operators now have a SEMP.

The number of operators that voluntarily participate in the Performance Measure Data Survey is high. More than 70 operators submitted data for one or more of the years covered by this report. For 1998, about two thirds of all the OCS operators submitted data.

The formulas for calculating the OCS safety and environmental performance indices were created in 1996 by the OCS Performance Measures Work Group. The Work Group included representatives from MMS, the U.S. Coast Guard, five industry trade associations, and 17 operating companies. The performance measures are outcome-based. More specifically, they establish 18 discrete incident rates in three performance categories:

SAFETY

Injuries, including recordable injuries or illnesses and lost workday cases for production, well drilling/workover/allied services, and construction operations;

Accidents, including well blowouts, fires, and explosions;

ENVIRONMENTAL

Oil spills, including frequency and volumes for three spill-size ranges;

Non-compliances of EPA National Pollutant Discharge Elimination System permit requirements; and

REGULATORY COMPLIANCE

Incidents of Non-compliance issued for violations of MMS safety regulations

The MMS collects or generates much of the information used to calculate these incident rates. The remaining data are supplied by operating companies that volunteer to participate in the annual OCS Performance Measures Data Survey. Seventy-two operating companies submitted performance data for 1998. These data cover more than 85 percent of 1998 OCS oil and gas production on a barrels of oil equivalent basis. The 1998 performance measures data set is the most accurate among the three data sets available. In order to generate complete data sets for 1996 and 1997, some of the participating operators submitted estimated data. However, by 1998 most of the participating operators had modified record-keeping programs to more directly support the OCS Performance Measures Program.

This report analyzes performance for 1998 and incorporates the 1996 and 1997 data that were included in an earlier report. Although the number of available data points is small (i.e., 1996, 1997, 1998), and some of the data are estimated, they are useful for making some initial observations about OCS safety and environmental performance. In addition, the data provide valuable insight into other aspects of OCS operations. For example, if participant data on hours worked are extrapolated based on total OCS production, it is possible to estimate the number of people working offshore. For 1998, the data suggest that 20,000-22,000 people worked on the OCS at any one time. Because of the split-shift work schedules used offshore, this equates to a 40,000-44,000

person offshore workforce. Finally, the 1996-1998 indices provide objective and normalized bases for assessing safety and environmental performance and regulatory compliance. The industry and MMS can use the indices as a basis for taking initiatives to improve performance in specific operational areas.

The 1998 data indicate that, relative to 1997, safety and environmental performance is improving in most measurement categories. Specifically, the summary table below shows improved performance for production and drilling lost workday cases and INCs, frequency of small (<1 bbl) and large (≥10 bbl) oil spills, large spill volume, NPDES permit compliance, and fires and explosions. Performance for production recordable injuries/illnesses remained relatively unchanged. Finally, the data show that performance has gotten worse for drilling and construction recordable injuries/illnesses, mid-size (≥1 to <10 bbl) oil spill frequency, and small and mid-size spill volume.

Summary of 1998 OCS Safety and Environmental Performance		
Better than 1997	Unchanged from 1997	Worse than 1997
	<i>Recordable Injuries/Illnesses – Production Operations</i>	<i>Recordable Injuries/Illnesses – Drilling/Workover/Allied Services Operations Construction Operations Combined Operations*</i>
<i>Lost Workday Cases – Production Operations Drilling/Workover/Allied Services Operations Combined Operations*</i>		<i>Lost Workday Cases – Construction Operations</i>
<i>Oil Spills – Number <1 bbl Number ≥10 bbl Volume ≥10 bbl Total Volume</i>		<i>Oil Spills – Number ≥1 to <10 bbl Volume <1 bbl Volume ≥1 to <10 bbl</i>
<i>MMS INCs – Drilling/Workover Operations Production Operations</i>		
		Blowouts
NPDES Non-compliances		
Fires and Explosions		

* Combined operations include production, drilling/workover/allied services, and construction.

1. INTRODUCTION

a. Performance Data Collection and Use

This report analyzes 18 OCS safety and environmental performance indices that were calculated for the period 1996-1998. The formulas used to generate the indices were developed in 1996 by the government/industry OCS Performance Measures Work Group (PMWG). The data used in the performance index calculations come from MMS records and from OCS lease operators that volunteered to participate in the OCS Performance Measures survey. Like the performance measure formulas, the survey was developed by the PMWG. The survey activity supports the broader OCS Performance Measures Program, which was conceived by MMS in 1996 as a tool for evaluating the effectiveness of the MMS SEMP and reducing or preventing OCS accidents. Some specific uses of the performance data are:

- *Benchmarking/standardization.* The PMWG created a uniform format for data reporting and common terminology for expressing performance. With this information, company managers will be better able to better focus their continuous improvement efforts. This knowledge should lead to more cost-effective corrective actions that help prevent accidents and thereby protect people and the environment. This perspective may also help industry focus its research and establish management system audit priorities.
- *Regulatory and Research Perspective.* Knowing how the OCS industry performs across each measure allows MMS to better focus its regulatory and research programs. MMS may focus on areas where the performance measures indicate OCS operators as a whole are having difficulty meeting MMS expectations. MMS will be better able to leverage its limited resources by redirecting research efforts, promoting appropriate regulatory initiatives, and shifting inspection program emphasis. Additionally, the MMS will use these measures in combination with other internal analyses to review OCS operator performance.
- *Public Information and Relations.* Offshore operators, trade organizations, and government regulators will have a credible data source for assessing industry performance. This information will also serve as a basis for comparing the safety record of the offshore oil and gas industry with other industries.
- *Performance Pacesetters.* The measures provide MMS with an objective basis for identifying industry leaders in the areas of safety and environmental performance. Companies that perform best are asked to make presentations at periodic Best Practices Workshops to explain techniques and processes they use to enhance their performance. Sharing best practices can elevate performance in all companies.
- *Alternative Approaches to Regulatory Compliance.* Some OCS operators have asked that MMS approve, on an ad hoc basis, alternative approaches to complying with MMS operating requirements. As conditions of approval MMS might require the operator to demonstrate good performance and successful SEMP implementation. This approach could provide operators the regulatory flexibility to more efficiently, and possibly more effectively, meet the Agency's performance goals. The OCS Performance Measures may provide a basis for MMS to determine whether an alternative compliance request is reasonable. MMS expects that operators will want to use additional performance indicators and information related to their management's proactive commitment to safe and environmentally sound operations to

support each specific request. Such leading indicators of performance often focus on the quality of the implementation of individual SEMP elements.

b. Performance Measures Steering Committee

The OCS Performance Measures Program activities are guided by the Performance Measures Steering Committee (PMSC). In addition to analyzing and reporting the performance data, the PMSC maintains the Performance Measures and organizes periodic OCS Best Practices Workshops. The PMSC includes representatives from government and industry (Table 1). PMSC products, including this report, are posted on the Safety Page of the MMS Internet site (<http://www.mms.gov/eod/safety.htm>).

Table 1. OCS Performance Measures Steering Committee Members	
Minerals Management Service	Cockrell Oil Corporation
U.S. Coast Guard	Enron Oil & Gas Company
American Petroleum Institute	Exxon Company USA
International Association of Drilling Contractors	Newfield Exploration Company
Independent Petroleum Association of America	Shell Offshore Inc.
Offshore Operators Committee	Taylor Energy Company
Chevron USA Inc.	

c. Performance Data Processing

Data gathered from participating OCS operators are combined with corresponding MMS data developed through its permitting, incident reporting, or facility inspection programs. Preliminary data are provided to participating companies for quality control purposes. MMS then performs arithmetic calculations that yield high, low, and industry or participants performance indices. The indices were reviewed by the PMSC to look for trends and verify or correct data anomalies.

2. PERFORMANCE RESULTS

The performance data and calculated performance indices cover a 3-year period (1996-1998). Although it is difficult to use this limited data set to make sweeping performance judgments, it is sufficient to identify short-term trends. Furthermore, the precision implied by the indices must be qualified by the fact that some of the data, especially for 1996 and 1997, represent survey participant estimates.

a. Data Qualifications

Before reviewing the performance data, it is important to note several key facts about the quality, completeness, and precision of the performance indices. The value of the information generated from the data is not in the precision of incident rate calculations. Rather, the value is the emphasis that the performance measurement process places on the critical issues of safety, environmental protection, and regulatory compliance. In addition, the following facts should be considered before making any judgements about performance results:

- ✓ There is no regulatory requirement for OCS operators to track the number of hours worked by either their own company or by their contractors. However, these data are needed to develop normalized injury rates. Prior to this project, many operators did not

keep track of contractors hours worked. As a result, some operators estimated hours worked during 1996 and 1997. Given the importance of these data, in normalizing the PMWG felt that informed estimates would be better than no data.

- ✓ For any incident rate, it is very likely that the high value belongs to one company. Conversely, the low value for any incident rate is often shared by several operators.
- ✓ For 1996 and 1997, there were differences among companies' internal procedures and some confusion in the categorization of various incidents. Some key examples are: whether construction activities are tracked separately from production activities; whether small, non-process fires were reported to MMS; and whether a light-duty or restricted duty case is logged as both a recordable injuries/illnesses and lost workday cases. Therefore, some variation might exist among operators regarding the interpretation of the request for data. This is not considered to be a significant issue for 1998 as evidenced by the relatively small number of inquiries received by MMS.
- ✓ The 1996 and 1997 MMS Production INC Rates are higher than the rates presented in the September 1998 report on OCS Performance Measures. The rates depend on the number of production safety system components inspected during partial MMS inspections. The MMS overestimated the number of components inspected. The recalculated rate for 1996 is 0.045. The recalculated rate for 1997 is 0.052. The MMS now records actual number of components inspected during a partial inspections.

b. Context of Survey Participant Data

It is important to put the performance measures data into context before discussing the specific performance incident rate calculations. Table 2 provides that context. In particular, note from Table 2 that:

- ✓ More than 70 OCS operators submitted data for at least one of the 3 years covered by this report. Most submitted data for all 3 years. The survey participants for 1998 represent more than 2/3 of all the OCS operators.
- ✓ More than 528 million barrels of oil were produced from the OCS during 1998. This volume represents 22% of total U.S. oil production during that year. Survey participants produced about 90% of the OCS total.
- ✓ Approximately 5.5 trillion cubic feet of natural gas were produced from the OCS during 1998. This represents 26% of total U.S. natural gas production for that year. Survey participants produced more than 80% of the OCS total.
- ✓ Survey participants produced more than 85% of total 1998 OCS oil and natural gas production on a BOE basis.
- ✓ Survey participants drilled 80% of the over 1100 wells spudded on the OCS during 1998.
- ✓ Survey participants operated more than 90% of the 3,900 OCS platforms during 1998.
- ✓ In 1998, survey participants reported that they and their contractors worked nearly 83 million hours. Drilling accounted for 48% of the total hours worked; production operations accounted for 40% and construction operations about 12%. Contractors worked about 80% of total hours, and they performed nearly all of the drilling and construction operations.

Table 2. OCS Performance Measures Data: 1996-1998

	1996	1997	1998
Total Wells Spudded	1109	1330	1142
Participants' Wells Spudded	791	1003	860
Total OCS Platforms			
Major	1967	1942	1984
Minor	1917	1924	1940
Participants' Platforms			
Major	1441	1434	1742
Minor	787	1556	1852
Total OCS Blowouts	4	5	7
Total OCS Fires/Explosions	87	125	92
Total OCS INCs			
Drilling	517	556	356
Production	5047	5204	3987
Total OCS Rig Inspections	2141	2060	1884
Total OCS Components Inspected	111786	100473	99480
Number of Oil Spills			
<1 bbl (Participants' Data)	1276	1156	1017
≥ 1 to < 10bbbls (Industry Data)	32	18	27
≥ 10 bbl (Industry Data)	9	9	6
Volume of Oil Spills			
<1 bbl (Participants' Data)	68.1	144.3	230.8
≥ 1 to < 10bbbl (Industry Data)	95.56	45.07	71.9
≥ 10 bbl (Industry Data)	462.45	514.19	194.4
EPA NPDES Non-compliances	649*	641*	617
* Exceedences only			
OCS Total Production	1,349,761,316	1,386,218,304	1,511,741,364
Oil & Condensate	433,538,113	463,422,064	528,483,947
Gas	5,143,677,063	5,180,578,090	5,516,074,108
BOE (5.61MCF/BOE)	1,349,761,316	1,386,218,304	1,511,741,364
Participants' Production	1,119,217,154	1,135,895,875	1,287,742,216
Oil	397,212,475	428,367,993	466,939,499
Participants' % Oil Production	91.6%	92.4%	88.4%
Gas	4,050,446,251	3,969,231,418	4,604,703,243
Participants' % Gas Production	78.75%	76.62%	83.48%
BOE (5.61MCF/BOE)	1,119,217,154	1,135,895,875	1,287,742,216
Participants' % BOE Production	82.9%	81.9%	85.2%
COMBINED OPERATIONS			
Overall Hours Worked**	59,119,692	72,907,353	82,849,731
Company	12,461,879	13,723,883	16,295,855
Contractor	46,657,813	59,183,470	66,553,876
Contractor % of Total	78.9%	81.2%	80.3%

Table 2 (Cont.)

Overall Recordable Injuries/Illnesses	1,002	1,100	1,399
Company	192	168	164
Contractor	810	932	1,235
Contractor % of Total	80.8%	84.7%	88.3%
Overall Lost Workday Cases	454	507	540
Company	89	88	78
Contractor	365	419	462
Contractor % of Total	80.4%	82.6%	85.6%
PRODUCTION			
Production Hours Worked**	26,931,585	29,369,456	32,914,231
Company	11,299,521	12,291,422	13,637,700
Contractor	15,632,064	17,078,034	19,276,531
Contractor % of Total	58.0%	58.1%	58.6%
Production Recordable Injuries/Illnesses	475	439	486
Company	190	161	157
Contractor	285	278	329
Contractor % of Total	60.0%	63.3%	67.7%
Production Lost Workday Cases	231	216	227
Company	88	85	76
Contractor	143	131	151
Contractor % of Total	61.9%	60.6%	66.5%
DRILLING, WORKOVER, & ALLIED SERVICES			
Drilling Hours Worked**	26,098,790	32,050,925	39,320,844
Company	980,090	1,192,565	1,726,285
Contractor	25,118,700	30,858,360	37,594,559
Contractor % of Total	96.2%	96.3%	95.6%
Drilling Recordable Injuries/Illnesses	439	564	754
Company	2	7	6
Contractor	437	557	748
Contractor % of Total	99.5%	98.8%	99.2%
Drilling Lost Workday Cases	177	248	259
Company	1	3	1
Contractor	176	245	258
Contractor % of Total	99.4%	98.8%	99.6%
CONSTRUCTION			
Construction Hours Worked**	6,089,317	11,486,972	10,614,656
Company	182,268	239,896	931,870
Contractor	5,907,049	11,247,076	9,682,786
Contractor % of Total	97.0%	97.9%	91.2%
Construction Recordables	88	97	159
Company	0	0	1
Contractor	88	97	158
Contractor % of Total	100%	100%	99.4%
Construction Lost Workday Cases	46	43	54
Company	0	0	1
Contractor	46	43	53
Contractor % of Total	100%	100%	98.1%

**** Some participants estimated hours worked for one or more years in different categories**

c. Definition of Terms

The terms used to characterize performance are defined below. They are included in the performance index tables (see Measure-by-Measure Discussion) and charts (see Appendix 2) included in this report. The formulas for calculating the performance indices are in Appendix 1. More detailed information about the formulas was published in October 1997 (see <http://www.mms.gov/eod/safety/perfmeas/pmreport.pdf>).

- *High Incident Rate* - The highest individual company incident rate calculated for a performance measure.
- *Industry Incident Rate (IIR)* - The performance index calculated using the raw data for all OCS operators. The IIR is NOT calculated using individual company incident rates. The IIR is reported for cases where MMS had all the data needed to calculate a performance index.
- *Low Incident Rate* - The lowest individual company incident rate calculated for a performance measure.
- *Participants' Incident Rate (PIR)* - The performance index calculated using raw data for all participants. The PIR is NOT calculated using individual company incident rates. The PIR is reported in cases where participants provided some of the data needed to calculate a performance index.

d. General Observations

The PMSC found the 1996-1998 performance indices to be intuitive. However, the wide range of performance within some measures clearly shows room for performance improvement. A summary of the differences between 1997 and 1998 performance for each measure is presented in Table 3. Performance for 1998 is considered better than for 1997 if the index decreased by at least 5 percent. Likewise, performance is considered relatively worse if the index increased more than 5 percent. The 1998 data indicate that, relative to 1997, safety and environmental performance is improving in most measurement categories. Specifically, the data indicate improved performance for production and drilling lost workday cases and INCs, frequency of small (<1 bbl) and large (≥10 bbl) oil spills, large spill volume, NPDES permit compliance, and fires and explosions. Performance for production recordable injuries/illnesses remained relatively unchanged. Finally, the data show that performance has gotten worse for drilling and construction recordable injuries/illnesses, mid-size (≥1 to <10 bbl) oil spill frequency, and small and mid-size spill volume.

Table 3. Summary of 1998 OCS Safety and Environmental Performance		
Better than 1997	Unchanged from 1997	Worse than 1997
	<i>Recordable Injuries/Illnesses – Production Operations</i>	<i>Recordable Injuries/Illnesses – Drilling/Workover/Allied Services Operations Construction Operations Combined Operations*</i>
<i>Lost Workday Cases – Production Operations Drilling/Workover/Allied Services Operations Combined Operations*</i>		<i>Lost Workday Cases – Construction Operations</i>
<i>Oil Spills – Number <1 bbl Number ≥10 bbl Volume <1 bbl Volume ≥10 bbl Total Volume</i>		<i>Oil Spills – Number ≥1 to <10 bbl Volume <1 bbl Volume ≥1 to <10 bbl</i>
<i>MMS INCs – Drilling/Workover Operations Production Operations</i>		
		Blowouts
NPDES Non-compliances		
Fires and Explosions		

* Combined operations include production, drilling/workover/allied services, and construction.

e. Measure-by-Measure Discussion

A 3-year performance index table is presented below each measure. Except for oil spills, the tables show the high individual, industry or participants, and low individual rates. The oil spill incident rates are calculated on an industry-wide basis for mid-size (≥1 bbl to <10 bbl) and large (≥10 bbl) spills, while small spill (<1 bbl) incident rates are based on participant data. The percent change between 1997 and 1998 indices is included in parenthesis. Note that a negative change indicates that performance improved while a positive change represents a performance decrease. The indices also are displayed graphically in Appendix 2.

- **Production Operations Recordable Injuries/Illnesses** - The production recordable injury incident rates for 1997 and 1998 were nearly the same (i.e., performance mostly unchanged). This suggests that for the past two years about 1 out of 35 employees incurred a recordable injury or illness while doing OCS production work.

Participants' Production Operations Recordable Incident Rate			
Year	1996	1997	1998
High Rate	16.3	15.5	50
PIR	3.53	2.99	2.95 (-1.3%)
Low Rate	0	0	0

- **Production Operations Lost Workday Injuries/Illnesses** - The PIR in 1998 indicates that about 1 out of 75 production employees incurred an injury serious enough to be classified as a lost workday case. This rate is 7.5% lower than the rate calculated for 1997 (i.e., performance improved). The lost workday incident rate implies that 1 out of every 2 recordable injuries or illnesses was serious enough to result in a lost workday case.

Participants' Production Operations Lost Workday Incident Rate			
Year	1996	1997	1998
High Rate	6.80	7.76	50
PIR	1.72	1.47	1.36 (-7.5%)
Low Rate	0	0	0

- **Drilling Operations Recordable Injury/Illness** - The data reported by participants indicate that during 1998 nearly 1 out of 25 drilling employees incurred a recordable injury. This represents a 9.1% increase over the 1997 incident rate (i.e., performance worsened). Note that even though these incidents are normalized for the different activity levels between years, they do not account for the fact that 1998 was another very active drilling year. The total number of hours reported for drilling, workover, and allied services category increased nearly 23% in 1998.

Participants' Drilling Operations Recordable Incident Rate			
Year	1996	1997	1998
High Rate	22.3	31.5	143
PIR	3.36	3.52	3.84 (+9.1%)
Low Rate	0	0	0

- **Drilling Operations Lost Workday Injury/Illness** - The index for lost workday injuries and illnesses related to drilling decreased by 15% between 1997 and 1998 (i.e., performance improved). This implies that 1 out of every 75 recordable drilling injuries or illnesses was serious enough to result in a lost workday case.

Participants' Drilling Operations Lost Workday Incident Rates			
Year	1996	1997	1998
High Rate	13.3	8.5	143
PIR	1.36	1.55	1.32 (-15%)
Low rate	0	0	0

- **Construction Operations Recordable Injury/Illness** - Recordable rates increased by 76% from 1997 to 1998 (i.e., performance worsened). This translates to 1 out of 35 employees in construction operations incurring a recordable injury while doing construction work during 1998.

Participants' Construction Operations Recordable Incident Rates			
Year	1996	1997	1998
High Rate	52.3	45.4	160
PIR	2.89	1.69	2.98 (+76%)
Low Rate	0	0	0

- **Construction Operations Lost Workday Injury/Illness** - The participants' 1998 incident rate increased by 36% over 1997 (i.e., performance worsened). This implies that 1 out of every 3 recordable injuries or illnesses was serious enough to result in a lost workday case.

Participants' Construction Operations Lost Workday Incident Rates			
Year	1996	1997	1998
High Rate	6.34	9.08	43.7
PIR	1.51	0.75	1.02 (+36%)
Low Rate	0	0	0

- **Combined Operations Recordable and Lost Workday Illness/Injury Rates** - These rates are generated by combining all of the production, drilling, and construction work hours and injuries or illnesses. The combined recordable injury rate for 1998 was 12% greater than the 1997 rate (i.e., performance worsened). Overall, the reported injury and illness data imply that nearly 1 out of every 30 offshore employees incurred a recordable injury during 1998. The combined lost workday illness/injury rate was 6% lower in 1998 than in 1997 (i.e., performance improved). Overall, the reported injury and illness data imply that about 1 out of every 3 recordable injuries was serious enough to result in a lost workday case.

Participants' Combined Operations Recordable and Lost Workday Incident Rates			
Year	1996	1997	1998
Recordable	3.39	3.02	3.38 (+12 %)
Lost Workday	1.54	1.39	1.30 (- 6%)

- **Fire and Explosion Incident Rate** - The 1998 industry incident rate for fires and explosions was 33% lower than the rate for 1997 (i.e., performance improved).

Industry Fire and Explosion Incident Rates			
Year	1996	1997	1998
High Rate	0.29	0.38	0.16
IIR	0.021	0.03	0.020 (-33%)
Low Rate	0	0	0

- **Blowout Incident Rate** - The 1998 industry incident rate for blowouts is 50% higher than the rate for 1997 (i.e., performance worsened). The MMS data indicate there were 7 well blowouts during 1998.

Industry Blowout Incident Rates			
Year	1996	1997	1998
High Rate	0.25	1.00	1.00
IIR	0.0036	0.0038	0.0061 (+60%)
Low Rate	0	0	0

- **Oil Spill Number Incident Rates** - The 1998 participants' data show a continued decline (i.e., performance improved) in the spill number incident rate for spill volumes less than 1 bbl. The industry data indicate that performance worsened (i.e., index increased 75%) for the number mid-size spills. Lastly, the 1998 industry large spill number incident rate was 50% lower than the 1997 rate (i.e., performance improved).

Oil Spill Number Incident Rates			
Year	1996	1997	1998
<1 bbl (PIR)	0.49	0.36	0.29 (-19%)
≥1 bbl to <10 bbl (IIR)	0.008	0.004	0.007(+75%)
≥10 bbl (IIR)	0.002	0.002	0.001 (-50%)

- **Oil Spill Volume Incident Rates** - For 1998 the total oil spill volume rate is 30% lower than for 1997 (i.e., performance improved). The 1998 total spill volume rate suggests that, during production, drilling, or construction operations, 1 barrel of oil spilled for every million barrels produced. More specifically, the data show that the 1998 spill volume rate for large spills is lower than for 1997 (i.e., performance improved). However, the mid-size spill and small spill volume incident rates increased for 1998 (i.e., performance worsened).

Oil Spill Volume Incident Rates (bbl per million bbl produced)			
Year	1996	1997	1998
<1 bbl (PIR)	0.17	0.34	0.49 (+44%)
≥1 bbl to <10 bbl (IIR)	0.22	0.10	0.14 (+40)
≥10 bbl (IIR)	1.07	1.11	0.37 (-67%)
Total (PIR/IIR)	1.46	1.55	1.00 (-35%)

- **NPDES Non-compliance Rate** - The 1998 NPDES non-compliance rate was 7.7% lower than for 1997 (i.e., performance improved).

Participant NPDES Non-compliance Rates			
Year	1996	1997	1998
High Rate	1.33	17	2.18
IIR	0.28	0.26	0.24 (-7.7%)
Low Rate	0	0	0

- **MMS Production INC Rate** - The production INC rate for 1998 is 23% lower than the rate for 1997 (i.e., performance improved). See note in Data Qualifications section about the recalculation of IIR's for 1996 and 1997.

Industry Production INC Incident Rates			
Year	1996	1997	1998
High Rate	0.30	0.31	0.91
IIR	0.045	0.052	0.040 (-23%)
Low Rate	0	0	0

- **MMS Drilling/Workover INC Rate** - The 1998 drilling and workover INC rate is 30% lower than the rate for 1997 (i.e., performance improved).

Industry Drilling/Workover INC Incident Rates			
Year	1996	1997	1998
High Rate	2.09	2.20	1.08
IIR	0.24	0.27	0.19 (-30%)
Low Rate	0	0	0

3. PMSC OBSERVATIONS AND COMMENTS

- The results seem to indicate a need to focus more attention on preventing construction injuries/illnesses. However, a review of all the injury/illness and lost workday rates shows that the recordable injury/illness rate for construction is no higher than the rate for either production operations or drilling/workover operations. Furthermore, the lost workday rate for construction is lower than the rate for either production or drilling.
- The 1998 performance measures data set is the most accurate among the three data sets available. In order to generate complete data sets for 1996 and 1997, some of the participating operators submitted estimated data. However, by 1998 most of the participating operators had modified record-keeping programs to more directly support the OCS Performance Measures Program.
- Although desirable to compare the recordable injury and lost workday indices with indices developed for other industries, a comparative analysis should be deferred for at least one more year. This is because comparable data for other industries for 1998 is not yet available from the Bureau of Labor Statistics. The 1996 and 1997 data contained in this report are, in part, based on estimates and may have been inconsistently reported.
- Some companies have observed that many new, short-service employees (i.e., less than 6 months) entered the workforce during 1998, and that many rigs either new to the Gulf, or that had been stacked, were quickly called into service. This may partially explain why the drilling/workover recordable injury rate continues to increase.
- The participant data on hours worked can be extrapolated based on total OCS production, to estimate the number of people working offshore. For 1998, the data suggest that 20,000-22,000 people worked on the OCS at any one time. Because of the split-shift work schedules used offshore, this equates to a 40,000-44,000 person offshore workforce. These data also indicate that 4 out of 5 people who work offshore are contract

employees. This highlights the fact that observed OCS safety and environmental performance depends mostly on how well contractors perform.

- For 1998, about half of the participating operators submitted data using e-mail or a web-based online data input form. Use of these methods for submitting data expedited processing of the data. The use these methods for collecting performance data should be expanded in future surveys.

APPENDIX 1. Performance Measure Definitions

FORMULAS

Production Operations Recordable Injuries or Illnesses

$$IIR = [(Annual\ number\ of\ production\ operations\ employees'\ OSHA\ recordable\ injuries\ and\ illnesses) / (Annual\ total\ number\ of\ production\ operations\ employee\ hours\ worked)] \times 200,000$$

Production Operations Lost Workday Injuries or Illnesses

$$PIR = [(Annual\ number\ of\ production\ operations\ employees'\ OSHA\ injuries\ and\ illnesses\ for\ which\ there\ were\ lost\ workdays) / (Annual\ total\ number\ of\ production\ operations\ employee\ hours\ worked)] \times 200,000$$

Drilling Operations Recordable Injuries or Illnesses

$$PIR = [(Annual\ number\ of\ drilling\ operations\ employees'\ OSHA\ recordable\ injuries\ and\ illnesses) / (Annual\ total\ number\ of\ drilling\ operations\ employee\ hours\ worked)] \times 200,000$$

Drilling Operations Lost Workday Injuries or Illnesses

$$PIR = [(Annual\ number\ of\ drilling\ operations\ employees'\ OSHA\ injuries\ and\ illnesses\ for\ which\ there\ were\ lost\ workdays) / (Annual\ total\ number\ of\ drilling\ operations\ employee\ hours\ worked)] \times 200,000$$

Construction Operations Recordable Injuries or Illnesses

$$PIR = [(Annual\ number\ of\ construction\ operations\ employees'\ OSHA\ recordable\ injuries\ and\ illnesses) / (Annual\ total\ number\ of\ construction\ operations\ employee\ hours\ worked)] \times 200,000$$

Construction Operations Lost Workday Injuries or Illnesses

$$PIR = [(Annual\ number\ of\ construction\ operations\ employees'\ OSHA\ injuries\ and\ illnesses\ for\ which\ there\ were\ lost\ workdays) / (Annual\ total\ number\ of\ construction\ operations\ employee\ hours\ worked)] \times 200,000$$

Combined Operations Recordable Injuries or Illnesses

$$PIR = [(Annual\ number\ of\ production,\ drilling,\ and\ construction\ operations\ employees'\ OSHA\ recordable\ injuries\ and\ illnesses) / (Annual\ total\ number\ of\ production,\ drilling\ and\ construction\ operations\ employee\ hours\ worked)] \times 200,000$$

Combined Operations Lost Workday Cases

$$PIR = [(Annual\ number\ of\ production,\ drilling\ and\ construction\ operations\ employees'\ OSHA\ injuries\ and\ illnesses\ for\ which\ there\ were\ lost\ workdays) / (Annual\ total\ number\ of\ production,\ drilling\ and\ construction\ operations\ employee\ hours\ worked)] \times 200,000$$

Oil Spill Number

PIR (less than 1 bbl) = (Annual number of oil spills less than 1 barrel on the OCS)/[(Number of major platforms) + 0.5(Number of minor platforms) + (Number of wells spudded for drilling during the year)].

IIR (1 bbl to less than 10 bbl) = (Annual number of all oil spills greater than or equal to 1 barrel and less than 10 barrels for the calendar year)/[(Number of major platforms) + 0.5(Number of minor platforms) + (Number of wells spudded for drilling during the year)]

IIR (10 bbl or more) = (Annual number of all oil spills greater than or equal to 10 barrels for the calendar year) /[(Number of major platforms) + 0.5(Number of minor platforms) + (Number of wells spudded for drilling during the year)]

Oil Spill Volume

PIR (less than 1 bbl) = (Annual total volume of all oil spills less than 1 barrel)/(Annual crude oil and condensate production on the OCS in millions of barrels)

IIR (1 bbl to less than 10 bbl) = (Annual total volume of all oil spills greater than or equal to 1 barrel and less than 10 barrels for the calendar year)/(Annual crude oil and condensate production on the OCS in millions of barrels).

IIR (10 bbl or more) = (Annual total volume of all oil spills greater than or equal to 10 barrels for the calendar year)/(Crude oil and condensate production on the OCS in millions of barrels)

PIR/IIR (all spill sizes) = (Annual total volume of all OCS oil spills reported for the calendar year)/(Annual crude oil and condensate production on the OCS in millions of barrels)

Fires and Explosions

IIR = (Annual number of fires and explosions)/[(Number of major platforms) + 0.5(Number of minor platforms) + (Number of wells spudded for drilling during the year)]

Blowouts

IIR = (Annual number of total industry blow-outs)/(Total number of wells spudded for drilling by industry during the year)

NPDES Non-compliance

PIR = (Number of reported non-compliances on EPA NPDES DMR's on the OCS for the reporting year)/[(Number of major platforms on the OCS) + (Number of wells spudded for drilling during the year)]

Production INC

IIR = (Annual MMS production INCs)/(Annual components inspected by MMS)

Drilling/Workover INC

$$IIR = (\text{Annual number of MMS drilling, workover, completion and well plugging and abandonment INCs}) / (\text{Annual number of MMS rig inspections})$$

VARIABLES

Blowout means any blowout reported to the MMS under 30 CFR Part 250.119(a).

DMR means the EPA Discharge Monitoring Report

Explosion means any explosion reported to the MMS under 30 CFR Part 250.119(a).

Fire means any fire reported to the MMS under 30 CFR Part 250.119(a).

IIR means the OCS Industry Incident Rate.

INC means an Incident of Non-compliance issued by the MMS.

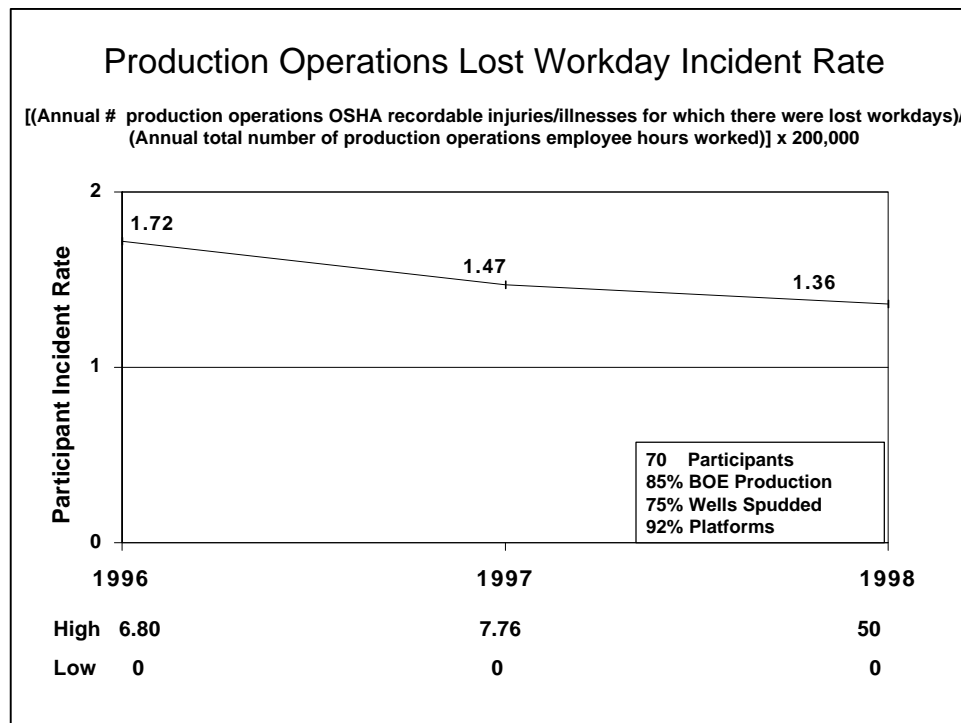
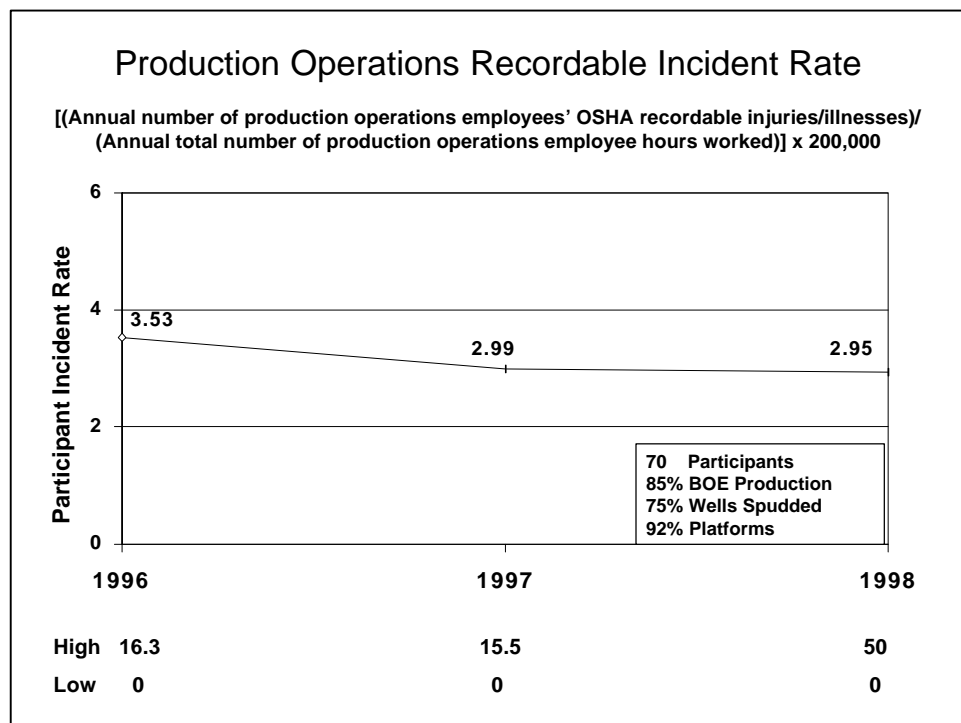
Major platform means structure that contains at least six or more completions **or** two or more pieces of production equipment.

Minor platform means a structure that contains fewer than six completions and fewer than two pieces of production equipment.

Oil Spill means any release of oil reported to the National Response Center or to the MMS under 30 CFR Part 254.46.

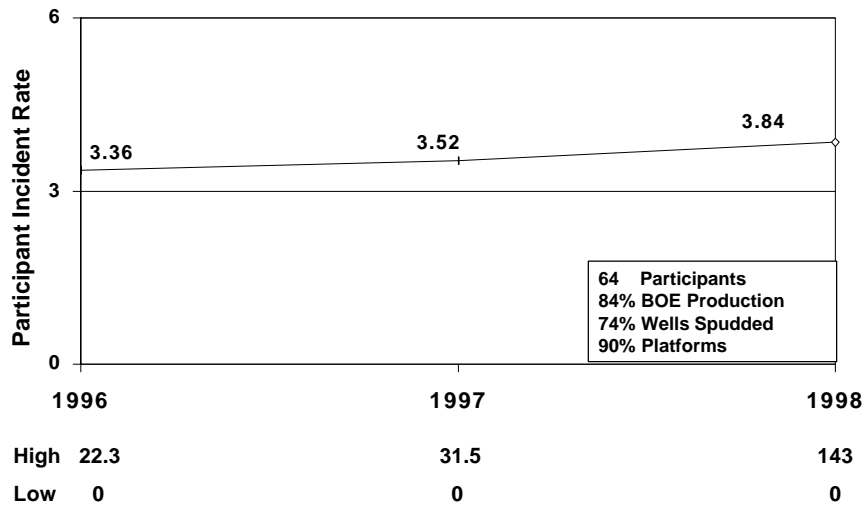
PIR means the Performance Measures Survey Participants' Incident Rate.

APPENDIX 2. Graphs of Performance Indices.



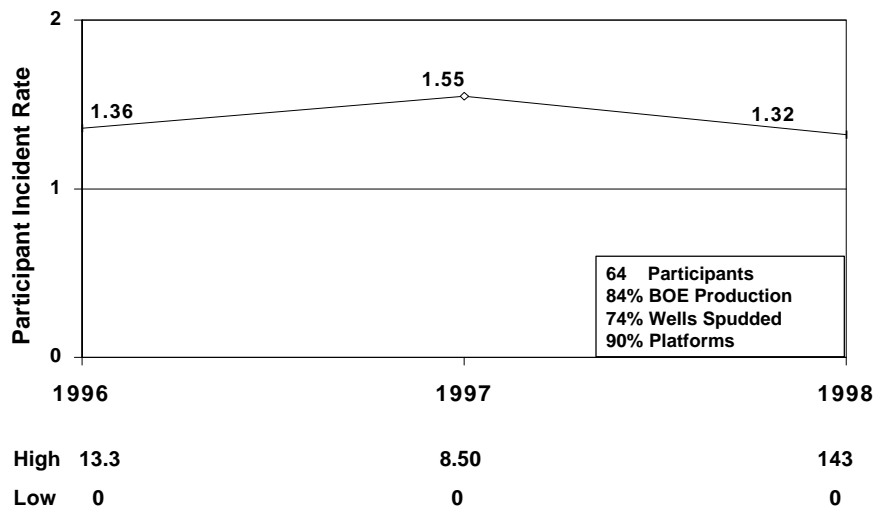
Drilling Operations Recordable Incident Rate

$$\frac{[(\text{Annual number of drilling operations employees' OSHA recordable injuries/illnesses}) / (\text{Annual total number of drilling operations employee hours worked})] \times 200,000}{\text{Participant Incident Rate}}$$



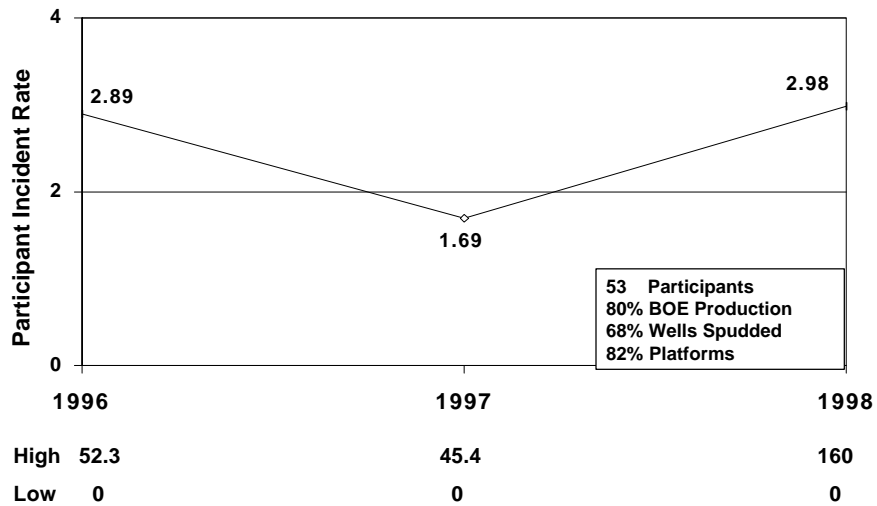
Drilling Operations Lost Workday Incident Rate

$$\frac{[(\text{Annual \# drilling operations OSHA recordable injuries/illnesses for which there were lost workdays}) / (\text{Annual total number of drilling operations employee hours worked})] \times 200,000}{\text{Participant Incident Rate}}$$



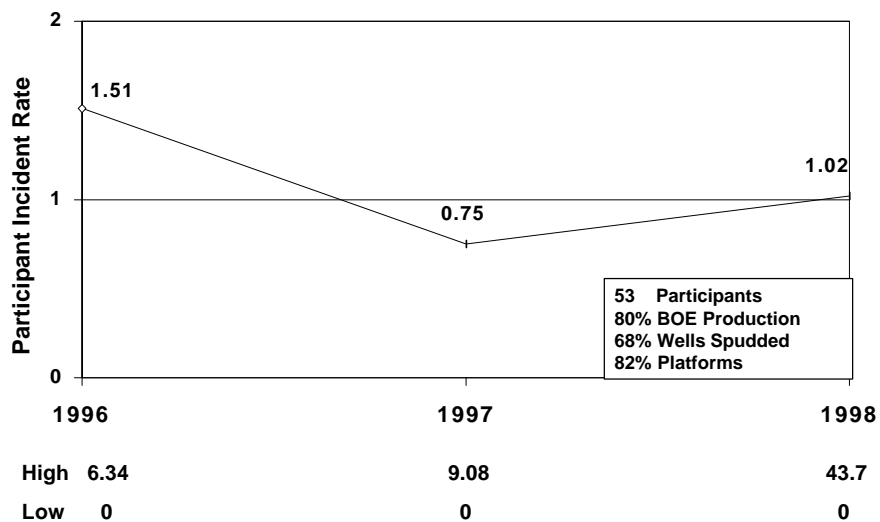
Construction Operations Recordable Incident Rate

$$\frac{[(\text{Annual number of construction operations employees' OSHA recordable injuries/illnesses}) / (\text{Annual total number of construction operations employee hours worked})] \times 200,000}{}$$



Construction Operations Lost Workday Incident Rate

$$\frac{[(\text{Annual \# construction operations OSHA recordable injuries/illnesses for which there were lost workdays}) / (\text{Annual total number of construction operations employee hours worked})] \times 200,000}{}$$



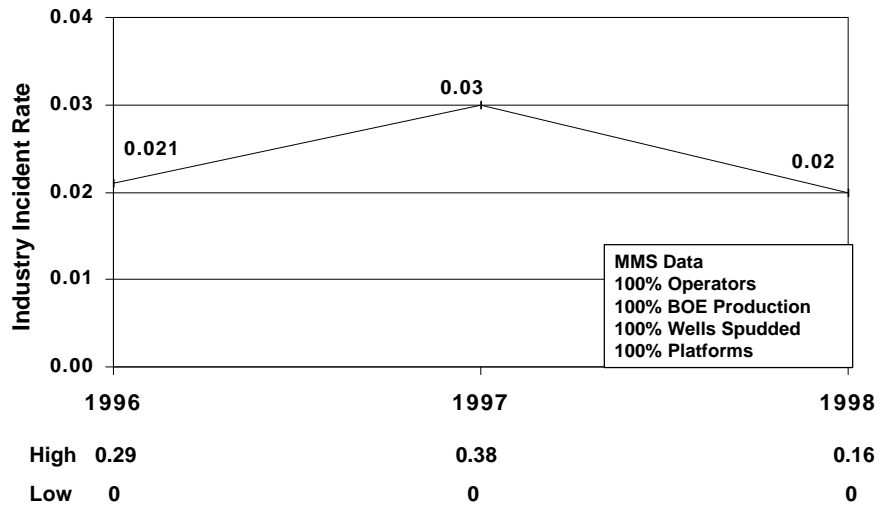
Combined Operations Recordable & Lost Workday Incident Rates

$$\frac{[(\text{Annual number of combined operations employees' OSHA recordable injuries/illnesses}) / (\text{Annual total number of combined operations employee hours worked})] \times 200,000}{}$$



Fire & Explosion Incident Rate

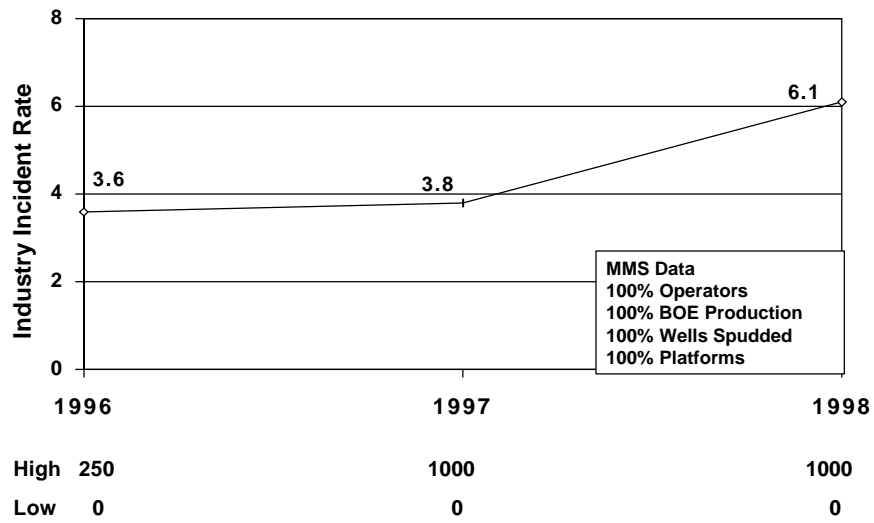
$$\frac{(\text{Annual No. of Fires and Explosions}) / (\text{No. of Major Platforms} + 0.5(\text{No. of Minor Platforms}) + \text{No. of Wells Spudded During the Year})}{}$$



Blowout Incident Rate

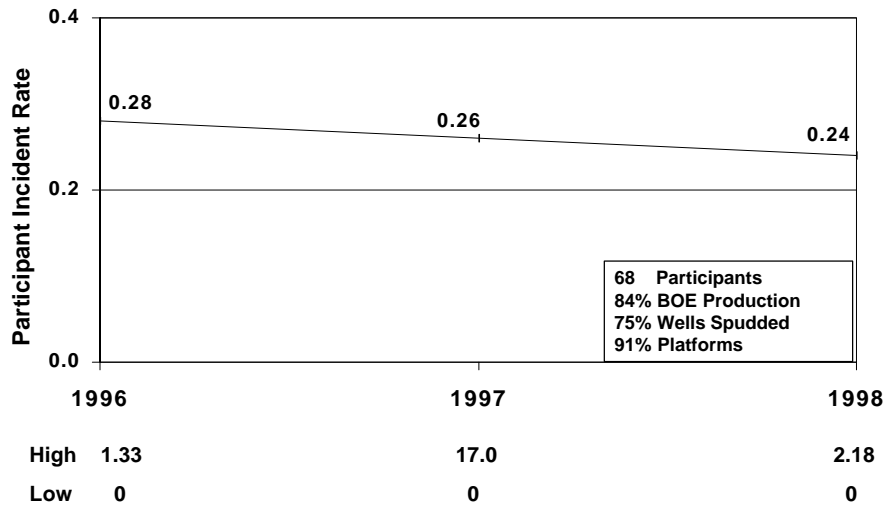
Per 1000 Wells Spudded

$[(\text{Annual \# Total Industry Blowouts})/(\text{Total Wells Spudded for Drilling During the Year})] \times 1000$



EPA NPDES Noncompliance Rate

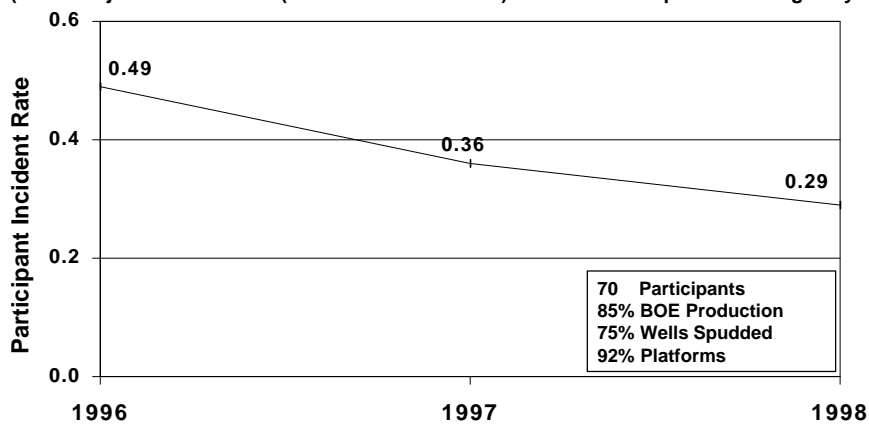
Number of non-compliances on EPA NPDES Discharge Monitoring Reports on OCS for the reporting year/
 (Number of Major Platforms + Number of Wells Spudded during the year)



Oil Spill Number Incident Rate

For Spills < 1bbl

Annual number of spills < 1bbl on the OCS/
(No. of Major Platforms + 0.5(No. of Minor Platforms) + No. of Wells Spudded during the year)



High 10.7

24.0

1.10

Low 0

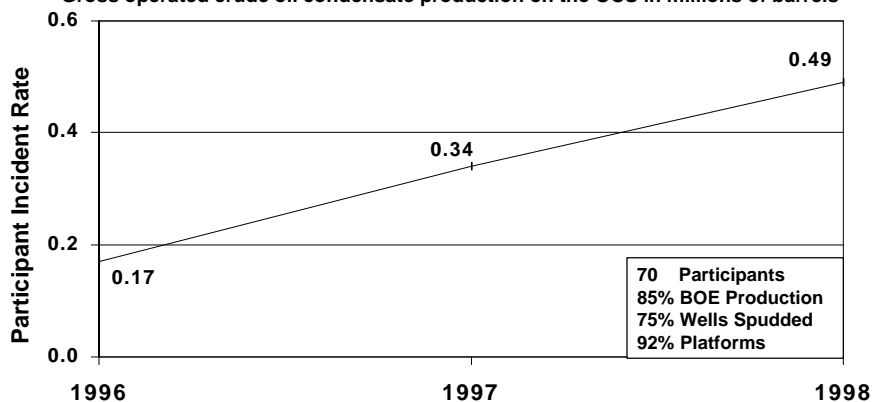
0

0

Oil Spill Volume Incident Rate

For Spills < 1bbl

Annual total volume of all spills < 1 bbl on the OCS/
Gross operated crude oil condensate production on the OCS in millions of barrels



High 10.5

24.3

13.5

Low 0

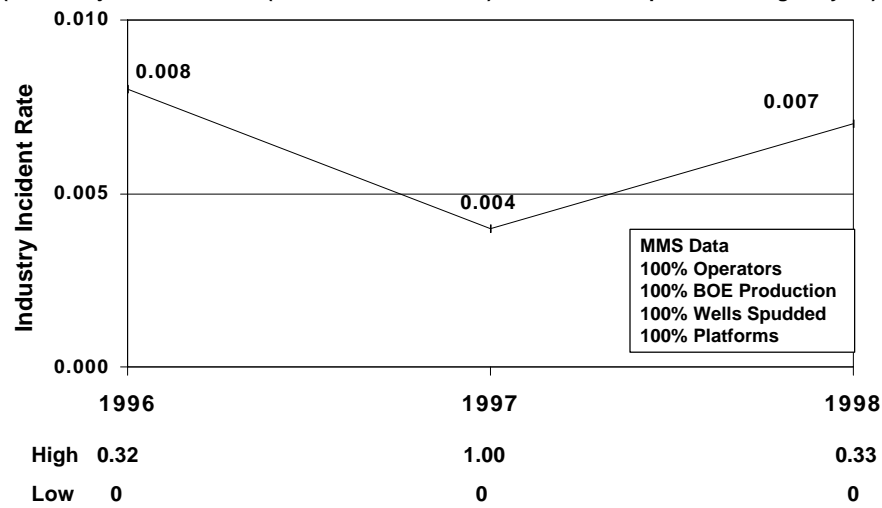
0

0

Oil Spill Number Incident Rate

For Spills ≥ 1 to <10 bbl

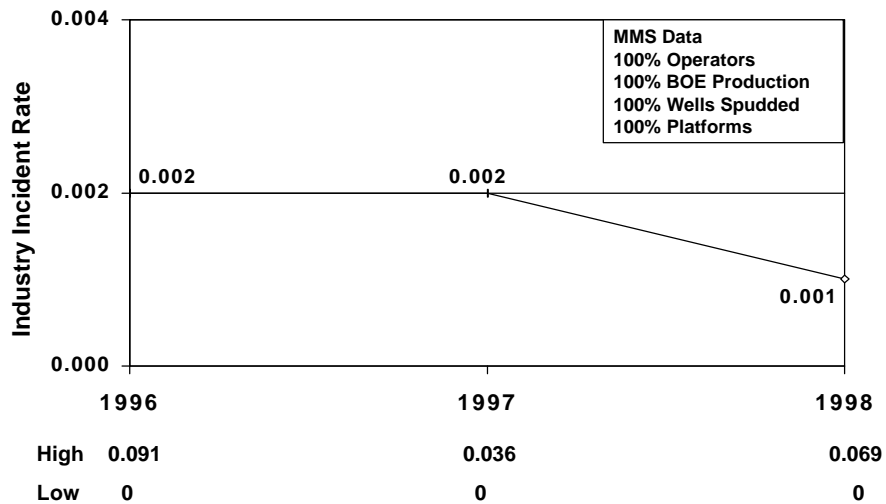
Annual number of spills ≥ 1 to <10 bbl on the OCS/
(No. of Major Platforms + 0.5(No. of Minor Platforms) + No. of Wells Spudded during the year)



Oil Spill Number Incident Rate

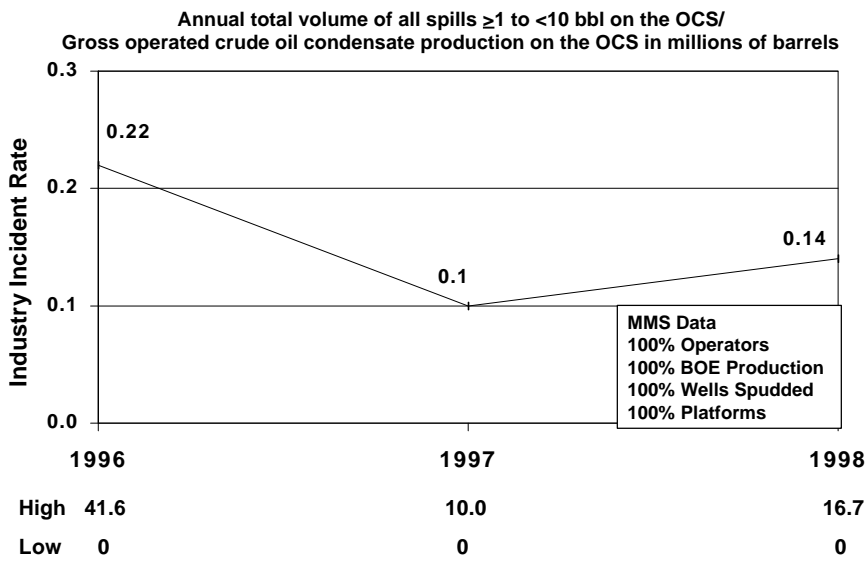
For Spills ≥ 10 bbl

Annual number of spills ≥ 10 bbl on the OCS/
(No. of Major Platforms + 0.5 (No. of Minor Platforms) + No. of Wells Spudded during the year)



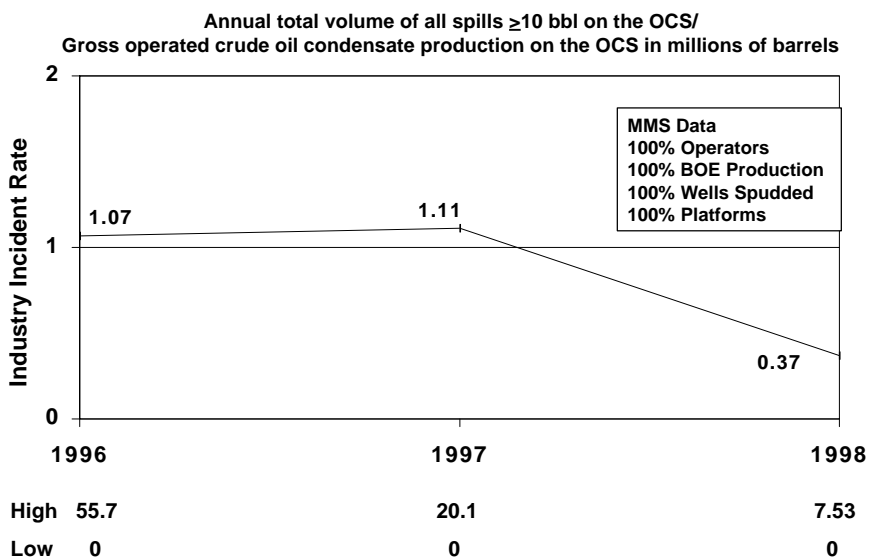
Oil Spill Volume Incident Rate

For Spills ≥ 1 to <10 bbl



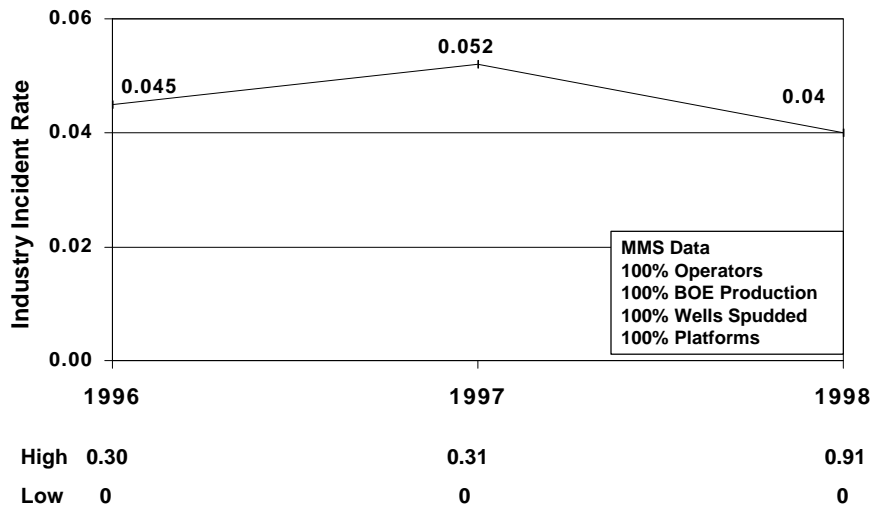
Oil Spill Volume Incident Rate

For Spills ≥ 10 bbl



Production INC Incident Rate

Annual number of MMS Production INCs/
Annual number of Components Inspected by MMS



Drilling/Workover INC Incident Rate

Annual number of MMS Drilling, Workover, Completion, and Well Plugging & Abandonment INCs/
Annual number of MMS Rig Inspections

